Centre for Research and Analysis of Migration

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Discussion Paper Series

CDP No 04/04

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April 2004

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Key Words: Immigrants, Children, School Enrollment, Pre-School
JEL Codes: I21, J15, J13

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I. Introduction

Immigration to the United States has increased sharply in recent decades and as a result the proportion of the U.S. population that is foreign born increased from less than five percent in 1970 to about 12 percent in 2004. This has been accompanied by an increase in "immigrant children," that is, both those who immigrate as children and the U.S.-born children of immigrants.

There is a clear public policy interest in the successful adjustment to the United States labor market of the immigrant parents, and there is also an important policy interest in the skill formation and, when they become adults, the labor market success of the immigrant children. Initial conditions matter for subsequent success in school and in the workforce, as is emphasized in the path dependence literature. These initial conditions include the early home environment. They also include whether children have access to opportunities during their pre-school years to prepare them socially, psychologically and intellectually for formal primary schooling. Perhaps more so than for the children of parents born and raised in the United States, pre-school in the U.S. in a formal institutional setting may be crucial for the adjustment to primary schooling of immigrant children. Yet, there is virtually no research on the pre-school enrollment of immigrant children.

This paper examines pre-school human capital accumulation, which is considered an important component of a child's educational attainment. Research on skill formation among youths has typically concentrated on issues such as investment in child quality versus child quantity, school performance, teenage dropout rates and college enrollment. These studies have examined differences by race, but rarely make comparisons between different immigrant groups, or study immigrant generational effects.[1] In particular, research on the lower or starting end of the educational spectrum, pre-school enrollment, among different immigrant groups is lacking. The present paper seeks to fill this void in the literature by developing and testing a model

[1] Notable exceptions for the U.S. include White and Glick (2000) and Glick and White (20003a, 2003b) and Chiswick and DebBurman (2004).

of pre-school enrollment among immigrant children and the U.S.-born children of immigrants.

Section II reviews the literature on pre-school human capital accumulation. Section III discusses the theory of human capital investment and the theory of demand for schooling, and uses them as a basis to formulate a theoretical model for studying pre-school enrollment. Section IV describes the 1990 Census of Population and Housing, the dataset used for this study, as well as the estimating equations. The estimation results are described in Section V. Finally, conclusions and policy implications are summarized in the last section.

II. Review of Literature

A diverse body of research that has relevance to pre-school enrollment was explored to formulate a theoretical model for this study. This section first reviews earlier studies that focus on child educational attainment and investment in child quality versus child quantity, followed by an overview of recent studies on non-maternal care for pre-school children.

Child educational attainment is typically measured by school performance and high school completion during teenage years, and by post-secondary education. Research on pre-school enrollment is relevant for educational attainment. Educational attainment in youth is shaped largely by circumstances, including the allocation of parental resources, experienced during early childhood. Therefore, to understand the factors that impact educational attainment it is important to study pre-school human capital acquisition (Tach and Forbes 2003). Moreover, variations in parental resources among diverse ethnic and immigrant groups may help explain the systematic differences in pre-school enrollment patterns by immigrants. A significant body of literature that studies factors determining child attainment has accumulated in the past two decades, but for the purpose of this study, only those papers that relate to pre-school enrollment will be reviewed.

In examining the process of child attainment, economists have mostly relied on the Becker-type model of family behavior. Becker and Lewis (1973) and Becker and Tomes (1976) view the family as an economic unit that employs real inputs (time

and money) to maximize utility for its members. One of Becker's (1991) most important contributions is the concept that parents obtain utility from the "quality" as well as the "quantity" of their children. The term "quality" is typically taken to be measured by the children's characteristics, such as educational attainment. Household utility is thus formulated as a function of the number of children, quality of children, and composite goods and services.

In exploring the interaction of the quantity and quality of children, Becker and Lewis (1973) and Becker (1991) emphasized that an increase in quality is more expensive if there are more children, since the increase has to apply to more children. Similarly, an increase in quantity is more expensive if the children are of higher quality, since higher-quality children cost more. Becker and Tomes (1976) further indicate that an increase in an individual's income has a relatively larger impact on increasing the quality of their children, rather than increasing the quantity of children.[2] However, an increase in income can lead to both an increase in quality and a decline in quantity if expenditures are roughly the same on all children and if the quality income elasticity of demand is relatively high and the quantity income elasticity is relatively low.

Both economic and other social science perspectives have emphasized the role of the family (particularly, family background and family composition) in child educational attainment. With respect to family background, three factors emerge as important. First, several studies (Hill and Duncan, 1987; Haveman et al., 1991; Manski et al. 1992) indicate that parental human capital, typically measured by their years of schooling completed, is a primary determinant of a child's educational attainment. Schoggen and Schoggen (1968) reinforce this by finding that the quality of time inputs is positively related to parent education. Leibowitz (1972) provides support for this by finding that the extent of quality time inputs by parents is positively related to parental education. In addition, Manski, et al. (1992) find that mother's education has a stronger impact on the child's attainment than does father's education. Second, many studies (Hill and Duncan, 1987; Duncan, 1994; Behrman et

[2] This is analogous to many "consumable durables" (such as cars and houses), where the income elasticity of demand for quantity is positive but smaller than the income elasticity of demand for quality.

al., 1995) observe that family income is positively associated with the educational attainment of the child. Lastly, the effect of mother's work on child attainment has yielded mixed findings.[3] While some studies find a negative effect (Krein and Beller, 1988), others find no effect (Leibowitz, 1977; Stafford, 1987)) or a positive effect (Haveman et al., 1991).

Two issues appear vital with regard to family composition. First, birth order and child spacing influence child attainment in families. Hanushek (1992) argues that depending on child spacing, the same completed family size corresponds to differing parental time inputs to children during preschool and schooling periods. Second, family structure is believed to be significant to child attainment; however, contrasting views prevail. Glick and White (2003a, 2003b), Krein and Beller (1988) and Haveman et al. (1991) point out that living in a one-parent family is negatively related to the level of schooling attained. In contrast to the negative effect of single-parent families, Stafford (1987) and Hanushek (1992) find that the absence of a father does not affect educational performance of children.

Chiswick (1988), Borjas (1992), and Dicks and Sweetman (1998) have contributed significantly to extending the existing literature by studying the child quality-quantity tradeoff at the level of ethnic groups. Chiswick (1988) finds that for the more successful groups, the mother's labor force participation rate is lower, particularly when the child is young. This relationship is consistent with Chiswick's earlier finding (1986) that the higher levels of schooling of American Jews is related to Jewish parents making greater investment in their children's home-produced human capital. Jewish women, compared to other women, made greater investments of their own time in the home-produced human capital of their children when the children were young (and time-intensive) and they worked more than other women when their children were older (and goods-intensive). Higher female labor force participation rates increased child quality through increased family money income but

[3] Studies in the sociological literature often use a socioeconomic status score or index rather than separate variables for parental education and income. They find very strong effects of socioeconomic status on children's schooling performance and attainment from kindergarten to post-secondary school education. See, for example, Glick and White (2003a, 2003b), White and Glick (2000) and Tach and Farkas (2003).

it came at the cost of parental time. When a child is young, time is considered more important than money income in raising child quality.

The studies on child quality discussed so far focused on two issues, namely outcomes (determinants of children's performance in school, and their schooling attainment), and inputs (time and money resources devoted to children). Earlier research on 'inputs' usually focused on the effects of variations in maternal time inputs on children of different ages. However, the dramatic increase in female labor force participation, especially the employment of mothers with young children, has made non-maternal care for young children a topic of increasing interest.

The child-care literature typically distinguishes between two major child-care arrangements. One is a formal day care center arrangement (referred to as center-based care), usually run by trained individuals, and offering a variety of educational and developmental programs. The second is an informal child-care arrangement involving unpaid or paid care by a relative, paid care in one's own home or paid care in a babysitter's home (referred to as family day care). Though each mode of child-care has its pros and cons, the sociology and psychology literature point to the advantage of pre-schoolers attending center-based day care over alternative arrangements (Berk 1985, Howes 1983, Ruopp et al., 1979). Day care centers allow children the opportunity to interact with peers, and typically expose children to several formal learning experiences that are beneficial for early childhood development. Compared to informal arrangement, however, day care centers are a more expensive, and yet less flexible arrangement (fixed time, no discounts for additional siblings), making it a less attractive option for some parents.

The two most commonly researched areas in child-care are the price and quality of available substitutes for maternal time. The seminal work in child-care done by Heckman (1974), which examined the link between child-care costs and female labor force participation, found a negative effect of cost on labor supply. Robins and Spiegelman (1978) found demand for paid child-care to be responsive to price and income. Blau and Robins (1988) provided the first direct evidence that child-care use is responsive to its price, and also indicated that the labor force participation of married mothers, as well as other family members, is responsive to child-care price. They found that higher child-care costs are negatively related to the probability that mothers will participate in the labor force. Duncan and Hill (1977) and Lehrer (1983,

1989) established a strong effect of mother's earnings on the use of center-based care, and they attributed this relation to the value of maternal time, and the reliability of formal day care.

Powell (1998) contributes to the child-care literature by distinguishing how part time and full time work is affected differently by child-care costs. The marginal cost of paid care and the availability of unpaid care decrease with hours worked, thus implying that the use of paid care is a function of hours worked. Powell finds that child-care costs have a stronger negative impact on the probability that a mother works full time. Furthermore, Connelly and Kimmel (2000) indicate that the probability of using center-based care increases with the full time employment of mothers, and mothers employed part time show a greater reliance on child care provided by relatives. Consequently, for both married and single women, part-time employment is less sensitive to the price of child-care than is full time employment. This differential effect of the price of child-care on full time versus part-time employment is in agreement with earlier studies, which established that informal child-care arrangements are more common among mothers working part time (Lehrer, 1983, 1989), while mothers working full time are more likely to choose a center-based/nursery school (Lehrer, 1989; Leibowitz et al. 1988; Ribar, 1992). Moreover, as Brayfield and Hofferth (1995) indicate, both cultural and economic factors influence the purchase of child-care by employed mothers. According to the authors, black mothers were less likely than white or Hispanic mothers to purchase care, holding economic resources and family structure constant. Leibowitz et al. (1988) also found that women with Hispanic or other foreign backgrounds are more likely to have relatives care for their children.

Lehrer (1989) specifically examined the determinants of the choice of child-care mode for pre-school age children and found that the probability of center care increases with an increase in mother's wage and increased markedly with an increase in mother's schooling. An increase in father's income level also raises the probability of using center-based care. Another important factor is the number of siblings. The presence of more than two siblings decreases the probability of choosing center care

for a pre-schooler.[4] However, when the pre-schooler has one sibling, the age of the sibling also matters. Since parents tend to make the same arrangements for all children, the presence of a sibling aged 3 to 5 increases the probability that a pre-schooler is enrolled in center care compared to the presence of either a younger or older sibling.

Lehrer's findings are in line with Leibowitz, et al. (1988) finding that income and education are strong determinants of labor force participation and child-care choice. Leibowitz, et al., (1988) also find that women who have higher education are more likely to work, but they are also more likely to provide the most age-appropriate care for their children. The education effect, however, is more ambiguous for the less-educated, low-earning mothers since they do not have the buying power to afford the most age-appropriate care.

In summary, much of the research on child attainment and child-care emphasizes that decisions made by parents regarding the generation of economic resources (e.g., labor supply and income) and the allocation of these resources (consumption, asset accumulation, investment in children) directly affects the pre-school human capital acquisition. Child quality investment models when applied to ethnic groups suggest that fertility rates, female labor force participation and socioeconomic conditions (parental education and income) in one generation are important variables for analyzing group outcomes in the next generation (Chiswick, 1998).

The human capital acquired in formal pre-school settings may be cognitive skills or noncognitive behavioral patterns, or a combination of the two.[5] From the point of view of the individual, either skill is productive if it enhances future educational attainment and eventual labor market success.

III. Theory and Hypotheses

[4] Other studies also find a negative effect of the number of siblings on a child's educational attainment. See, for example, Glick and White (2003a).

[5] For recent assessments of the on-going debate, see Bowles and Gintis (2002) and Farkas (2003).

This study uses the human capital framework for analyzing pre-school enrollment. Within this framework, attention is focused on factors that affect the demand for pre-schooling, particularly in the context of immigrants. Becker (1967, reprinted 1993) developed a model of optimal schooling. The model's underlying assumption is that individuals face a demand schedule, which reflects the marginal rate of return on investments in schooling, and a supply schedule, which reflects the marginal interest cost of obtaining funds to finance the investment in schooling. Optimal investment occurs when the marginal rate of return on investment equals the marginal interest cost of funds.

Parental investment in their children's schooling is determined principally by four factors: parental education, family income, family size and composition, and mother's time (Becker and Lewis, 1973; Leibowitz, 1974; Haveman et al., 1991). Furthermore, when investing in their children, parents base their decisions on tradeoffs they choose to make between the number of children and the resources (both parental time and parental income) per child. Becker (1991) emphasized the importance of the interaction between quantity and quality of children for understanding fertility behavior, developing a formal model to study the child 'quality-quantity tradeoff'.

In the context of immigrants, Chiswick (1988) postulates that parental investment in children may be strongly influenced by the ethnic group to which they belong. Ethnic groups differ in their perceptions as to optimal family size (fertility), investment in child quality, and female labor force participation. This fundamental difference leads to group differences in relative prices of child quality and quantity. The group for which the cost of quantity is relatively higher than the cost of quality will invest more in fewer higher quality children. Chiswick (1998) attributes racial and ethnic group differences in the parental investment in children in part to these group differences. He asserts that if two groups initially differ only in the price of quantity relative to quality of children, the quantity-quality fertility model generates group differences in fertility, skill formation, earnings and rates of return from human capital; and these differences are transmitted from generation to generation.

Based on the above discussions, the theoretical equation for the demand for enrollment in a pre-school program for a child immigrant may be written as:

Schooling = f (Pre-immigration conditions, Parental education, Parental income, Family size, Mother's labor supply, Duration in the destination)

The model of immigrant adjustment based on human capital theory suggests that immigrant assimilation in the host country is positively related to length of stay. Implicit in the concept of 'assimilation' is the role of immigrant generation, if we further distinguish between the native-born who have foreign-born parents (second-generation immigrants) and the native-born who have native-born parents (native-parentage).

Based on the theoretical model discussed above, this paper focuses on the following questions:

1. Do "immigrant children", whether child immigrants or the U.S.-born children of immigrants, have a different pattern of pre-school enrollment compared to native-parentage children?
2. Among "immigrant children", does the pre-school enrollment rate differ by immigrant generation?
3. Among child immigrants, does pre-school enrollment rate differ by country of origin?

IV. Data and Estimating Equations

The empirical analysis discussed in this paper is based on data from the 1% Public Use Microdata Samples (PUMS) of the 1990 Census of Population and Housing. The 1990 Census provides information for children (living at home) and their parents on race/ethnicity, place of birth, years of schooling, and language spoken at home, along with basic demographic and economic information. For immigrants, the census also provides the time period in which they entered the United States. This combination of demographic and schooling information permits comparative analyses between the foreign-born and the native-born, and among the foreign-born by country of origin. The definitions of the variables are provided in Appendix Table A-1.

The Sample

The total sample size of the 1990 1% PUMS was 2,500,052. The study of pre-school enrollment was conducted for all children from age 3 through age 5. The relevant sample size was 100,393. Since the Census provides data for all persons living in a sampled household, it was possible to create a dataset linking parental information (parental place of birth, parental education and labor-force participation) to each child record based on the relationship of the respondent to the household head. The nature of the reported Census data did not permit identification of parents of those children living with grandparents (these children were less than 1% of the full sample), or those living with others who were not their parents, thus excluding them from this analysis. Furthermore, there was no information on the absent parent in case of single parent families, so observations with either parent missing were dropped. This analysis was limited to two-parent households and the sample size is reduced to 80,885.

The populations studied were first-generation immigrant children, second-generation immigrant children, and native-parentage children. 'First-generation' immigrant children ("child immigrants") were defined as those born outside the United States. "Second-generation" immigrant children ("children of immigrants") were defined as those born in the U.S. but having one or both foreign-born parents. "Native-parentage" children were defined as those born in the U.S. of U.S.-born parents. Children born in U.S. outlying areas, such as Puerto Rico and similar areas over which the United States exercises jurisdiction, as well as children born of American parents living abroad were excluded from this analysis. Also excluded in the definition of the generation variables were children who have both parents born in U.S. outlying areas. The size of the first-generation sample was 1,556, that of the second-generation sample 9,392, and the size of the native-parentage sample was 69,766. Therefore, the pooled sample size after the exclusions was 80,714.

The Estimating Equation

The explanatory variables for the pre-school enrollment equation are: Human Capital Variables (age, years-since-immigration), Demographic Control Variables (south, rural, black, hispanic, and male), Family Variables (parental education,

parental income, family size, mother's labor force participation) and Country of Origin Variables.

The dependent variable, school enrollment, is a dichotomous variable defined to equal one if the child age 3 to 5 years, inclusive, is enrolled in pre-school or school, otherwise it is zero. Pre-school or school include all center-based or school-based programs such as Head Start, nursery school, day care and kindergarten (Census, 1993, B34).

The basic estimating equation for pre-school enrollment can be written as:

School Enrollment = *f* (H, D, G, C, F)

H is a vector of human capital variables including age and age at immigration. It is reasonable to expect enrollment to rise with age if we are looking at a sample of children age 3 to 5. To test the relation between school enrollment and age, dichotomous age variables were introduced into the estimating equation. In analyzing the 3 to 5 age-group, one age-at-immigration variable is included to capture the effect of immigration prior to versus immigration after age 2 years.

D is a vector of demographic control variables for gender, and race/ethnicity. Dichotomous variables for being black and hispanic were used to measure the impact of racial disadvantage on pre-school enrollment and male was used to control for gender differentials in pre-school enrollment.

G is a vector of geographic variables. Dichotomous variables, south, representing south/non-south residence, and rural, representing urban/rural residence, control for the effect of region of residence and urbanization on pre-school enrollment, respectively.

C is a vector of country of origin dichotomous variables. Their purpose is to capture broad ethnic group variations in family characteristics and other country-of-origin fixed effects. The English-speaking countries are the benchmark when the analyses is limited to the foreign-born.

F is a vector of family variables. Mother's Education, Father's Education, and Family Income are expected to have a positive impact on pre-school enrollment rates. Both family size and mother's labor supply serve as proxies for both the time-investment that a parent makes in a child, and other similar parental investments, hence their importance in the pre-school enrollment equation. A large family size is

expected to lower pre-school enrollment, while a greater mother's labor supply is expected to enhance it.

V. Empirical Analysis

Descriptive Statistics

Comparative statistics for the three immigrant generations are summarized in Table 1. School enrollment among three to five year olds is slightly lower for first-generation children (42 percent), compared to either the second-generation or native-parentage children (both at 43 percent). A much higher percentage of the first-generation and second-generation children are Hispanic when compared to the native-parentage children (over 40 percent versus 5 percent), but the percent black in the three groups is about the same (6 percent). As can be expected, all native-parentage children are proficient in English, while about 95 percent of second-generation children are proficient, and about 83 percent of first-generation children are proficient. The average education level of the mother and the father rises with each immigrant generation – it is lowest for first-generation (11 years), increases by a year for the second-generation, and by more than another year for the native-born parents.

The percentage of mothers with children age 3 to 5 years that participate in the labor market (either full-time or part-time) also rises substantially from first-generation (31 percent), to second-generation (47 percent), to native-parentage (55 percent) children. Perhaps the mother in a first-generation immigrant family is a tied mover and hence is more likely to have a lower labor force participation, particularly in the initial years after migration.

Table 2 reports selected data by country of origin for the sample of 1,556 first-generation 3 to 5 year old children. As column 2 of Table 2 indicates, approximately 6 percent of immigrants are from English-speaking countries (United Kingdom, England, Australia, New Zealand and the English-speaking islands in the Caribbean Sea). The dominant immigrant source country is Mexico (nearly 38 percent), followed by South and Central America (10 percent), and East Asia (8 percent). Column 3 of the same table reports that the pre-school enrollment rate is highest for immigrant

children from Cuba and North and West Europe (82 percent), followed by English-speaking countries (61 percent), China (58 percent), Africa and East Asia (53 percent). Immigrant children from the Caribbean (23 percent), Mexico (34 percent) and the Middle East (34 percent), on the other hand, have the lowest enrollment rates.

Probit Analysis

The dependent variable for the probit equation is 'school enrollment', the dichotomous variable for enrollment status (whether currently enrolled in school or not). The empirical analysis begins with the probit analyses of the pooled sample of first- and second- generation immigrant children along with native-parentage children. Then, a probit analysis on the first-generation sample offers a comparison of school enrollment of first-generation immigrant children from different countries of origin. Lastly, the probits are run separately by immigrant generation to allow a comparative study of the relative importance of different determinants of school enrollment for each of the three groups.

Pooled Sample

Probit equations for the pooled sample are reported in Table 3 with predicted probabilities reported in Table 4. Corresponding marginal effects are reported in Appendix Table A-2. Two different specifications were considered. The primary explanatory variables used in both specifications were male, black, Hispanic, South, rural, English proficiency, mother and father's education level, mother's labor force participation, household income, and dichotomous variables representing the number of siblings and the child's age. Two variables are included to explain the effects of first-generation and second-generation and a dichotomous variable on age-at-immigration to capture the effect, if any, of the child migrating prior to versus migrating after age 2 years. The second specification adds birthplace dichotomous variables to the original set of explanatory variables.

The reference child for the predicted probabilities in Table 4 for the pooled sample is defined as a 4 year old native white male proficient in English with a non-working mother, no siblings, and residing in an urban, non-South region with mean values for the continuous variables.

The significant positive coefficients of the two immigrant generation variables indicate that first- and second- generation immigrants have a higher probability of being enrolled in pre-school compared to a native parentage child (Table3). The predicted probability of pre-school enrollment (Table 4 column 1) increases from 38 percent for native-parentage children, to 42 percent for second-generation children, to 48 percent for first-generation children. The negative coefficient of the age 3 variable and the positive coefficient of the age 5 variable indicate that the probability of enrollment in pre-school increases with age. Blacks are more likely than others to be enrolled in pre-school with the probability of enrollment increasing from 38 percent to 45 percent. The Hispanic origin variable, and the gender variable (male) are, however, not statistically significant. Living in rural areas has a strong negative effect on enrollment, lowering enrollment from 38 percent to 30 percent, but the regional variable South is statistically insignificant.

The mother's labor supply variables have a positive and significant impact on school enrollment – the probability of enrollment increases from 38 percent to 40 percent if the mother works full time in contrast to not working at all, and by even more, to 44 percent if the mother works part time. This finding is a little surprising given that other research suggests that mothers working full time are more likely than those working part time to use center-based care (Lehrer, 1983; 1989; Connelly and Kimmel, 2000). However, since more educated mothers are better aware of the benefits of pre-school (Lehrer, 1989; Leibowitz et al, 1988), it is also likely that part-time working mothers as well as non-working mothers enroll their children in pre-school for even a few days a week.

The dichotomous variables for number of siblings indicates that children with one sibling are more likely to be enrolled in pre-school than are children with no siblings, however, children with three or more siblings are less likely to be enrolled than an only child. The impact of family size on pre-school enrollment is thus non-linear. Given that pre-schools tend to be expensive, and do not offer discounts for additional siblings, it is reasonable that pre-school enrollment decreases as family size expands beyond a certain point.

As hypothesized, the education levels of the mother and the father have a positive and significant effect (Table 3). The variable for mother's education has a larger magnitude than and is more highly significant that of father's education. The

stronger impact of mother's education is clear when we look at predicted probabilities (Table 4). A decrease in mother's education below the mean education to 8 years reduces a child's probability of enrollment from 38 percent to 29 percent, but the same decrease in father's education reduces the enrollment probability from 38 percent to only 32 percent, by only about two-thirds as much. Similarly, an increase in the level of mother's education above the mean to 18 years increases the probability of enrollment to 47 percent, but the same increase in the father's education raises the enrollment probability to only 43 percent. This finding is consistent with the strong positive relation between mother's schooling and pre-school enrollment, as established in the child-care literature (Lehrer, 1989; Leibowitz et al., 1988).

Lastly, total family income has a strong positive effect on enrollment choice. An increase in income from $20,000 to $70,000, for example, increases the probability of enrollment from 33 percent to 44 percent. Pre-school is not mandatory, and unlike kindergarten which is offered in public schools, pre-school tends to be private and charges tuition, therefore, holding other factors constant, pre-school enrollment tends to increase with the level of the family's income.

The second specification in (Table 3 column 2), includes the explanatory variables in column 1, plus the birthplace dichotomous variables representing the child's country of origin. The benchmark is native-parentage children age 3 to 5 years; hence the coefficients represent the difference in enrollment between first-generation immigrant children from a particular country and all native-parentage children. Inclusion of the country variables has a limited impact on the magnitudes or statistical significance of most of the variables in the original estimating equation. Most of the birthplace coefficients are not statistically significant.[6] The only foreign country groups whose children are significantly different from native parentage children are the English-speaking countries, North and West Europe, East Asia, Other Asia, and Mexico and all five of them affect school enrollment positively. For example, the probability of school enrollment (Table 4 column 2) increases from 38 percent for native-parentage children to 57 percent for immigrant children from

[6] Since the majority of the country-of-origin variables are insignificant, the predicted probabilities were re-calculated on a modified version of specification 2 which included only the significant variables. Omission of the insignificant variables had minimal to no effect on the original predicted probabilities.

English-speaking countries, and to 81 percent for immigrant children from North and West Europe, other variables being the same.

First-Generation Sample

Probit results for the first-generation sample are summarized in Tables 5 and 6. As in the analysis of the pooled sample, two different specifications are considered. The discussion here focuses on the probit coefficients and the predicted probabilities. Corresponding marginal effects are reported in Appendix Table A-3. Model (1) of the probit for the first-generation 3 to 5 age-group sample (Table 5 column 1) shows that mother's education, father's education, family income, and Hispanic origin are the only continuous variables statistically significant in explaining the probability of pre-school enrollment among the foreign-born. While parental education and family income have a positive effect on pre-school enrollment, being Hispanic has a negative effect.

When analyzing the first-generation sample, the reference child is a 4-year old male immigrant from an English-speaking country with age-at-immigration less than 2 years. Pre-school enrollment clearly increases with age since the probability of enrollment (column 1 of Table 6) increases from 15 to 34 to 69 percent from 3-year, to 4-year, to 5-year olds, respectively. The positive coefficient on the two sibling variables that are significant indicate that children with one sibling, as well as those with more than four siblings have a higher probability of being enrolled in pre-school compared to an only children. Unlike what was found in the pooled sample, the negative effect of increased family size on pre-school enrollment is not found among the first-generation immigrants.

The second specification (Table 5 column 2) includes the explanatory variables in column 1, plus the birthplace variables. The benchmark is first-generation children from English-speaking countries in the 3 to 5 age-group, hence the coefficients represent the difference in enrollment between first-generation children from a particular country and first-generation children from English-speaking countries. Inclusion of the country of origin variables has no impact on the magnitudes or statistical significance of most of the variables in the original estimating equation. The only variable that is affected is Hispanic, which turns from

negative significant to positive insignificant, but it is highly collinear with the Latin American country variables.[7] Moreover, only a few of the country-group variables show statistical significance. The only coefficients that are significant are Mexico, Caribbean, East and Central Europe, South Asia, and Middle East.[8] Thus, with these exceptions, other variables being the same, country of origin does not matter for pre-school enrollment. Immigrant children from these countries, however, have a lower probability of pre-school enrollment in comparison to the benchmark, the English-speaking countries. For example, the probability of school enrollment (Table 6 column 1) decreases from 46 percent for immigrant children from English-speaking countries, to 28 percent for immigrant children from South Asia, and to 17 percent for Caribbean immigrant children. This may reflect a preference for care provided by relatives among immigrants from these countries.

Comparative Study of First- and Second-Generation, and Native-parentage Children

Probit equations estimated separately for first-generation, second-generation and native-parentage children are presented in Tables 7 and 8. Corresponding marginal effects are reported in Appendix Table A-4. The coefficients of the native-parentage sample probit equations are very similar to the pooled sample probit coefficients because natives constitute approximately 86 percent of the total pooled sample in each age group.

Major differences are observed across the three immigrant generations regarding the effect of race/ethnicity and parental education. The race variable, black, is not significant in explaining the pre-school enrollment for first-generation children. However, for both second-generation and native-parentage children being black has a

[7] To test if the sign of Hispanic was sensitive to the sample sizes of the three major Hispanic source countries, Mexico, Cuba, and South and Central America, the three groups were combined into a single country variable and specification 2 was re-run. The combined variable was statistically insignificant and Hispanic continued to be positive and insignificant.

[8] Since the majority of the country of origin dummy variables are not statistically significant, the predicted probabilities were re-calculated on a modified version of specification 2 which included only the significant variables. Omission of the insignificant variables raised the predicted probabilities associated with Mexico, Caribbean, and Middle East, but lowered the probability associated with South Asia.

positive impact on the probability of pre-school enrollment, other variables being the same. This result contradicts the Brayfield and Hofferth (1995) finding that black mothers are less likely to use paid care for their pre-schoolers, possibly because this study is of two-parent households. Being Hispanic, on the other hand, does not impact the enrollment probability for native-parentage children but it reduces the probability of pre-school enrollment for second-generation as well as first-generation children.

The effect of the mother and father's education level is less pronounced in the first- and second- generation compared to the native-parentage generation. Perhaps for first-generation and second-generation immigrants, education is a less relevant measure of parental human capital. As mother's education increases from 8 years to 18 years, the probability of enrollment increases from 33 percent to 44 percent for first-generation and second-generation children. For the same increase in mother's education, the enrollment probability increases from 27 percent to 50 percent for the native-parentage children.

To study the effect of foreign-parentage on pre-school enrollment, the analysis focuses on the sample of all native-born children (i.e., second-generation and native-parentage children). Three variables are introduced into the basic regression specification, mother only foreign-born, father only foreign-born, and both parents foreign-born. The results indicate that having only a foreign-born father or having both parents foreign born raises the probability of pre-school enrollment compared to having both parents native born (Tables 7 and 8, column 3).

Parents do not appear to treat their 3 to 5 year old sons differently than their daughters. The dichotomous gender variables have very small coefficients and are not statistically significant. When the equations are computed separately for boys and girls the coefficients do not vary by gender.

VI. Discussion and Conclusions

An increasing percentage of children ages 3 to 5 years receive some formal pre-school education. Social scientists have often indicated the short-term (achievement test gains) and long-term benefits (increased likelihood of completing high school) associated with pre-school education. Pre-school programs, however, are

typically private and charge tuition, so that it is not surprising to find differences in enrollment rates by family income and race/ethnicity. Since pre-school education is believed to be an important education resource, and yet its access was limited to children from economically better off families, the federal government initiated programs such as Head Start to allow children from low income families to enroll in pre-school. For the purpose of this analysis, pre-school included all school-based or center-based programs, such as Head Start, nursery school, day care and kindergarten.

This study's major finding is that among two-parent households the determinants of pre-school enrollment differ significantly among the three immigrant generations. Other variables (age, family size, parental education, etc.) held constant, both first-generation and second-generation children are 5 to 10 percentage points more likely to be enrolled in pre-school than their native-parentage counterparts.

The two variables intended to capture minority group effects (black and Hispanic) impact pre-school enrollment differently for the three immigrant generations. Being black does not affect the probability of pre-school enrollment among first-generation children. But among second-generation and native-parentage children, blacks are about 7 percentage points more likely than non-blacks to enroll in pre-school in the two parent families studied. Being Hispanic, on the other hand, has no impact on the enrollment probability of native-parentage children, but lowers the probability of enrollment of first-generation and second-generation children by about 5 percentage points. This disadvantage among first-generation and second-generation Hispanic children persists even after controlling for their parent's below average education and low income coupled with limited English proficiency.

The positive role of parental education in pre-school enrollment is somewhat stronger among native-parentage children relative to either first-generation or second-generation children. Moreover, mother's labor force participation has no effect on the pre-school enrollment attendance of first-generation children, a small positive effect on pre-school enrollment attendance of second-generation children, and the strongest positive impact on native-parentage children's pre-school enrollment.

Other variables held constant, household income has a strong positive association with the probability of being enrolled in pre-school. The sign, magnitude and significance of the sibling variable varies among the different immigrant

generations, and hence the effect of family size (as proxied by number of siblings) on pre-school enrollment is not clear from this analysis.

Another major finding of this study is the substantial heterogeneity that exists among immigrants depending on their country of origin. When the analyses are performed separately by country of origin, basic patterns observed overall are still found in the equations. The probit analysis demonstrates that immigrant children from Mexico, Caribbean, East and Central Europe, South Asia, and the Middle East have a lower probability of being enrolled in pre-school than their immigrant counterparts from English-speaking developed countries, other variables being the same.

Overall, the results described here demonstrate that the pre-school enrollment of children vary by immigrant generation and by country of origin. The policy implications of these findings are significant, particularly for the minority groups studied. The analysis clearly indicates that parental education, family size and family income are important factors in pre-school enrollment. Yet many black and Hispanic students are disadvantaged in this respect signifying low rates of pre-school. Since pre-school prepares children for elementary school, policies that encourage economically and socially disadvantaged families to enroll their children in pre-school may have much value. Such policies will enable children from disadvantaged groups to start elementary school on an equal level, or at a smaller disadvantage, compared with other children.

TABLE 1

SUMMARY STATISTICS OF VARIABLES, FIRST-GENERATION, SECOND-GENERATION, AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

Variable	First-Generation	Second-Generation	Native-Parentage
School Enrollment	0.42 (0.49)	0.43 (0.49)	0.43 (0.50)
Male	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)
Age	4.08 (0.83)	3.99 (0.82)	4.01 (0.82)
Age-at-Immigration	1.82 (0.93)	n.a.	n.a.
Black	0.05 (0.21)	0.07 (0.25)	0.07 (0.26)
Hispanic	0.50 (0.50)	0.43 (0.49)	0.05 (0.21)
South	0.23 (0.42)	0.26 (0.44)	0.34 (0.47)
Rural	0.05 (0.21)	0.08 (0.28)	0.31 (0.46)
English Proficiency	0.83 (0.38)	0.95 (0.21)	100.00 (0.04)
Mother's education	10.49 (4.83)	11.73 (3.98)	13.46 (2.14)
Father's education	11.19 (5.17)	12.11 (4.35)	13.66 (2.40)
Mother works full-time	0.23 (0.42)	0.34 (0.47)	0.33 (0.47)
Mother works part-time	0.08 (0.27)	0.13 (0.34)	0.22 (0.41)
Mother not working	0.69 (0.46)	0.53 (0.50)	0.45 (0.50)
Number of siblings	1.75 (1.50)	1.58 (1.22)	1.38 (1.01)
Only child	0.18 (0.38)	0.14 (0.35)	0.15 (0.36)
Household Income	30800.16 (32964.88)	42429.30 (37026.46)	44130.63 (33453.64)
Sample size	1,556	9,392	69,766

Note: Variables are as defined in Appendix Table A-1.
n.a. = Variable not applicable.
Standard errors for all variables are in parenthesis.

Source: 1990 Census of Population of United States, Public Use Microdata Sample, 1 percent sample.

TABLE 2

SUMMARY STATISTICS OF SELECTED VARIABLES, BY COUNTRY OF ORIGIN, FIRST-GENERATION CHILDREN, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

Country of origin	Sample Size	Percent of all Foreign-Born	Enrollment Rate
English-speaking countries	91	5.8	61
Africa	29	1.9	53
Mexico	588	37.8	34
Cuba	3	0.2	84
S. & C. America	148	9.5	44
Caribbean	38	2.4	23
Southern Europe	34	2.2	49
E. & C. Europe	89	5.7	48
N. & W. Europe	20	1.3	82
Philippines	41	2.6	50
China	13	0.8	58
Vietnam	28	1.8	46
East Asia	123	7.9	53
South Asia	73	4.7	47
Middle East	57	3.7	34
Other Asia	111	7.1	36
Remainder Countries	70	4.5	50
Total	1,556	100.0	42

Note: Variables are as defined in Appendix Table A-1.

Source: 1990 Census of Population of United States, Public Use Microdata Sample, 1 percent sample.

TABLE 3

PROBIT ESTIMATES OF POOLED SAMPLE OF FIRST-GENERATION, SECOND-GENERATION, AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
Constant	-1.426 (24.68)	-1.429 (24.48)
Male	0.002 (0.15)	0.001 (0.14)
Age3	-0.635 (52.11)	-0.635 (52.13)
Age5	0.777 (67.88)	0.778 (67.88)
Black	0.176 (8.61)	0.178 (8.70)
Hispanic	0.003 (0.14)	0.007 (0.35)
South	0.015 (1.38)	0.014 (1.34)
Rural	-0.215 (20.13)	0.214 (20.09)
English Proficiency	-0.148 (3.10)	-0.153 (3.18)
Mother's Education	0.049 (19.00)	0.050 (19.11)
Father's Education	0.029 (12.35)	0.029 (12.42)
Mother works full-time	0.036 (3.16)	0.036 (3.14)
Mother works part-time	0.156 (12.10)	0.155 (12.08)
1 Sibling	0.046 (3.20)	0.046 (3.19)
2 Siblings	0.029 (1.82)	0.029 (1.79)
3 Siblings	-0.055 (2.62)	0.056 (2.64)
4+ Siblings	-0.082 (3.00)	-0.083 (3.03)
Household Income	5.46e-06 (32.33)	5.44e-06 (32.14)
First-Generation	0.243 (4.90)	n.e.
Second-Generation	0.097 (5.70)	0.096 (5.63)
Age-at-Immigration 2+	-0.163 (2.32)	-0.139 (1.93)

TABLE 3 (Continued)

PROBIT ESTIMATES OF POOLED SAMPLE OF FIRST-GENERATION, SECOND-GENERATION, AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
BIRTHPLACE		
English speaking countries	n.e.	0.483 (3.27)
Africa	n.e.	0.088 (0.34)
Mexico	n.e.	0.213 (1.03)
Cuba	n.e.	0.197 (1.53)
S. & C. America	n.e.	0.159 (1.35)
Caribbean	n.e.	-0.343 (1.38)
Southern Europe	n.e.	0.348 (1.48)
E. & C. Europe	n.e.	-0.059 (0.39)
N. & W. Europe	n.e.	1.196 (3.24)
Philippines	n.e.	0.147 (0.69)
China	n.e.	0.614 (1.61)
Vietnam	n.e.	0.443 (1.76)
East Asia	n.e.	0.257 (2.02)
South Asia	n.e.	0.053 (0.32)
Middle East	n.e.	-0.122 (0.67)
Other Asia	n.e.	0.450 (3.36)
Remainder Countries	n.e.	0.554 (3.31)
Pseudo R^2	0.174	0.174
Sample size	80,714	80,714

Note: Variables are as defined in Appendix Table A-1.
n.e. = Variable not entered.
t statistics are in parenthesis.

Source: 1990 Census of Population of United States, Public Use Microdata Sample, 1 percent sample.

TABLE 4

PREDICTED PROBABILITIES OF SCHOOL ENROLLMENT FOR POOLED SAMPLE, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

Reference Child[a]	**0.38**	Reference Child[b]	**0.38**
Female	0.38	English speaking	0.57*
Age3	0.17*	Africa	0.41
Age5	0.68*	Mexico	0.46
Black	0.45*	Cuba	0.81
Hispanic	0.38	S. & C. America	0.44
South	0.39	Caribbean	0.26
Rural	0.30*	Southern Europe	0.52
Not English-proficient	0.44*	E. & C. Europe	0.36
First-Generation	0.48*	N. & W. Europe	0.81*
Second-Generation	0.42*	Philippines	0.43
Age-at-immigration 2+	0.32*	China	0.62
1 Sibling	0.40*	Vietnam	0.55
2 Siblings	0.39	East Asia	0.48*
3 Siblings	0.36*	South Asia	0.40
4+ Siblings	0.35*	Middle East	0.33
Mother works full-time	0.40*	Other Asia	0.56*
Mother works part-time	0.44*		
Mother's Education			
8	0.29*		
10	0.32*		
16	0.43*		
18	0.47*		
Father's Education			
8	0.32*		
10	0.34*		
16	0.41*		
18	0.43*		

TABLE 4 (Continued)

PREDICTED PROBABILITIES OF SCHOOL ENROLLMENT FOR POOLED SAMPLE, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

Reference Child[a]	**0.38**		
Household Income (mean = 42937.7)			
20,000	0.33*		
30,000	0.35*		
60,000	0.42*		
70,000	0.44*		

Reference child is a 4 year old native white male proficient in English with a non-working mother, and no siblings, residing in an urban, non-south region with mean values for the continuous variables.

* indicates that estimated coefficient of the probit model was significant.

Source: Table 3

TABLE 5

PROBIT ESTIMATES OF FIRST-GENERATION CHILDREN,
UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
Constant	-1.204 (5.89)	-0.865 (3.21)
Male	0.060 (0.86)	0.052 (0.73)
Age3	-0.645 (5.95)	-0.692 (6.27)
Age5	0.891 (9.15)	0.902 (9.14)
Black	-0.015 (0.08)	0.026 (0.12)
Hispanic	-0.166 (2.09)	0.056 (0.32)
South	0.094 (1.13)	0.051 (0.59)
Rural	0.009 (0.06)	-0.002 (0.01)
English Proficiency	0.071 (0.64)	0.069 (0.61)
Mother's Education	0.026 (2.40)	0.025 (2.22)
Father's Education	0.023 (2.29)	0.023 (2.21)
Mother works full-time	0.028 (0.32)	0.024 (0.28)
Mother works part-time	0.205 (1.52)	0.180 (1.31)
1 Sibling	0.274 (2.63)	0.313 (2.94)
2 Siblings	0.093 (0.81)	0.101 (0.86)
3 Siblings	0.089 (0.63)	0.147 (1.01)
4+ Siblings	0.338 (2.49)	0.420 (3.02)
Household Income	4.49e-06 (4.08)	3.61e-06 (3.31)
Age-at-immigration 2+	-0.165 (1.94)	-0.176 (2.04)

TABLE 5 (Continued)

PROBIT ESTIMATES OF FIRST-GENERATION CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
BIRTHPLACE		
Africa	n.e.	-0.315 (1.03)
Mexico	n.e.	-0.595 (2.55)
Cuba	n.e.	0.789 (0.94)
S. & C. America	n.e.	-0.427 (1.84)
Caribbean	n.e.	-0.847 (2.59)
Southern Europe	n.e.	-0.235 (0.82)
E. & C. Europe	n.e.	-0.542 (2.56)
N. & W. Europe	n.e.	0.762 (1.91)
Philippines	n.e.	-0.387 (1.45)
China	n.e.	0.185 (0.44)
Vietnam	n.e.	-0.330 (1.11)
East Asia	n.e.	-0.138 (0.70)
South Asia	n.e.	-0.469 (2.09)
Middle East	n.e.	-0.683 (2.90)
Other Asia	n.e.	-0.335 (1.58)
Remainder Countries	n.e.	-0.093 (0.39)
Pseudo R^2	0.182	0.200
Sample size	1,556	1,556

Note: Variables are as defined in Appendix Table A-1.
n.e. = Variable not entered. t statistics are in parenthesis.

Source: 1990 Census of Population of United States, Public Use Microdata Sample, 1 percent sample.

TABLE 6

PREDICTED PROBABILITIES OF SCHOOL ENROLLMENT FOR FIRST-GENERATION CHILDREN, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

Reference Child[a]	**0.34**	Reference Child[b]	**0.46**
Female	0.32	Africa	0.34
Age3	0.15*	Mexico	0.24*
Age5	0.69*	Cuba	0.75
Black	0.34	S. & C. America	0.30
Hispanic	0.29*	Caribbean	0.17*
South	0.38	Southern Europe	0.37
Rural	0.35	E. & C. Europe	0.26*
Not English Proficient	0.32	N. & W. Europe	0.74
Age-at-immigration 2+	0.29	Philippines	0.31
1 Sibling	0.45*	China	0.53
2 Siblings	0.38	Vietnam	0.33
3 Siblings	0.38	East Asia	0.40
4+ Siblings	0.47*	South Asia	0.28*
Mother works full-time	0.35	Middle East	0.21*
Mother works part-time	0.42	Other Asia	0.33
Mother's Education (mean=10.37)			
8	0.32*		
12	0.36*		
16	0.40*		
18	0.42*		
Father's Education (mean=11.12)			
8	0.32*		
12	0.35*		
16	0.41*		
18	0.41*		
Household Income (mean = 31,879)			
10,000	0.31*		
20,000	0.32*		
50,000	0.37*		
60,000	0.39*		

Reference child is a 4 year old male (non-black, non-Hispanic) immigrant (age-at-immigration less than 2) from an English-speaking country with a non-working mother, and no siblings, residing in an urban, non-south region with mean values for the continuous variables.

* Indicates that estimated coefficient of the probit model was significant.
Source: Table IV Part A

TABLE 7

PROBIT ESTIMATES OF SECOND-GENERATION AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	Second-Generation	Native-Parentage	All Native-Born
Constant	-1.007 (9.85)	-1.699 (14.17)	-1.443 (21.92)
Male	0.006 (0.20)	-0.001 (0.04)	0.001 (0.02)
Age3	-0.683 (19.14)	-0.631 (48.21)	-0.635 (51.79)
Age5	0.863 (24.37)	0.772 (63.08)	0.777 (67.33)
Black	0.198 (3.19)	0.194 (8.87)	0.181 (8.78)
Hispanic	-0.110 (3.20)	-0.014 (0.55)	-0.007 (0.34)
South	0.090 (2.73)	0.006 (0.56)	0.014 (1.34)
Rural	-0.154 (3.31)	-0.205 (18.56)	-0.212 (19.84)
English Proficiency	-0.025 (0.37)	-0.139 (1.22)	-0.172 (3.05)
Mother's Education	0.029 (5.62)	0.062 (19.67)	0.052 (19.30)
Father's Education	0.012 (2.45)	0.038 (13.38)	0.030 (12.35)
Mother works full-time	0.015 (0.45)	0.039 (3.19)	0.034 (3.00)
Mother works part-time	0.118 (2.69)	0.154 (11.31)	0.155 (11.94)
1 Sibling	0.056 (1.26)	0.035 (2.23)	0.040 (2.75)
2 Siblings	0.114 (2.38)	0.009 (0.54)	0.026 (1.59)
3 Siblings	0.017 (0.29)	-0.078 (3.40)	-0.060 (2.79)
4+ Siblings	0.033 (0.47)	-0.156 (5.05)	-0.108 (3.85)
Household Income	5.09e-06 (11.22)	5.22e-06 (28.04)	5.41e-06 (31.57)
Mother foreign-born	n.e.	n.e.	0.051 (1.57)
Father foreign-born	n.e.	n.e.	0.076 (2.52)
Both parents foreign-born	n.e	n.e	0.130 (5.78)
Pseudo R^2	0.197	0.173	0.174
Sample size	9,392	69,766	79,158

Note: Variables are as defined in Appendix Table A-1. n.e. = Variable not entered. t statistics are in parenthesis.
Source: 1990 Census of Population of United States, Public Use Microdata Sample, 1 percent sample.

TABLE 8

PREDICTED PROBABILITIES OF SECOND-GENERATION, AND NATIVE – PARENTAGE CHILDREN, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

	Second-Generation	**Native-Parentage**	**All Native-Born**
Reference Child	**0.37**[a]	**0.39**[b]	**0.38**[c]
Female	0.37	0.39	0.38
Age3	0.16*	0.18*	0.18*
Age5	0.70*	0.69*	0.68*
Black	0.45*	0.47*	0.45*
Hispanic	0.33*	0.39	0.39
South	0.41*	0.39	0.39
Rural	0.31*	0.32*	0.31*
Not English Proficient	0.38	0.45	0.45*
1 Sibling	0.39	0.41*	0.40*
2 Siblings	0.41*	0.40	0.39
3 Siblings	0.38	0.36*	0.36*
4+ Siblings	0.38	0.33*	0.34*
Mother works full-time	0.38	0.41*	0.40*
Mother works part-time	0.42*	0.45*	0.44*
Mother foreign-born	n.e.	n.e.	0.46
Father foreign-born	n.e.	n.e.	0.47*
Both parents foreign-born	n.e.	n.e.	0.50*
Mother's education (mean=11.7d;13.4;13.2) [(a)]			
8	0.33*	0.27*	0.29*
10	0.35*	0.32*	0.32*
16	0.42*	0.46*	0.44*
18	0.44*	0.50*	0.48*

TABLE 8 (Continued)

PREDICTED PROBABILITIES OF SECOND-GENERATION, AND NATIVE –PARENTAGE CHILDREN, UNITED STATES, 1990

AGE-GROUP 3 TO 5 YEARS

	Second-Generation	Native-Parentage	All Native-Born
Reference Child	**0.37**	**0.39**	**0.38**
Father's education (mean=12.04;13.58;13.40) [(a)]			
8	0.35*	0.31*	0.32*
10	0.36*	0.34*	0.34*
16	0.39*	0.43*	0.42*
18	0.40*	0.46*	0.44*
HH Income (mean=42676;43220;43155) [(a)]			
10,000	0.31*	0.33*	0.32*
20,000	0.30*	0.35*	0.34*
50,000	0.38*	0.41*	0.40*
60,000	0.40*	0.43*	0.42*

Reference child is a 4 year old native white male proficient in English with a non-working mother, and no siblings, residing in an urban, non-south region with mean values for the continuous variables.

[a] Means for second-generation, for native parentage and for all native born, respectively

*Indicates coefficient of the probit model was statistically significant.

Source: Table 7

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APPENDIX

TABLE A-1

DEFINITION OF VARIABLES

Variables	Code	Description #
Dependent Variable: School Enrollment	ENROLLMENT	Child age 3 to 5 enrolled in a public or private pre-school or center based program
Explanatory Variables:		
Gender variable	MALE	DV: Male
Age Variables	Age 3 Age 4 Age 5 Age-at-immigration 2+	DV: Age 3 DV: Age 4 DV: Age 5 DV: Two years old or older at migration
Race/Ethnicity	BLACK	DV: Black
	HISPANIC	DV: Hispanic
Place of Residence	SOUTH	DV: South
	RURAL	DV: Rural Area
Country of origin variables*	AFRICA	DV: Africa
	MEXICO	DV: Mexico
	CUBA	DV: Cuba
	CESOAMER*	DV: South /Central America
	CARIBBEAN*	DV: Caribbean
	SOUEURO*	DV: Southern Europe
	EACEURO*	DV: East or Central Europe
	NOWEURO*	DV: North or West Europe
	PHILIPIN	DV: Philippines

TABLE A-1 (continued)

DEFINITION OF VARIABLES

Variables	Code	Description
	CHINA	DV: China
	VIETNAM	DV: Vietnam
	EASTASIA*	DV: East Asia
	STHASIA*	DV: South Asia.
	MIDEAST*	DV: Middle-East
	OTHASIA*	DV: Other Asia
	ENGLISH SPEAKING*	DV: English speaking countries
	REMAIN*	DV: All other countries and foreign country not reported
Immigrant Generation variables	FIRST GENERATION	DV: first-generation immigrant
	SECOND GENERATION	DV: second-generation immigrant, born in U.S., has at least one foreign born parent
	MOMFOR	DV: second generation immigrant with foreign-born mother but not foreign-born father
	DADFOR	DV: second generation immigrant with foreign-born father but not foreign-born mother
	BOPFOR	DV: second generation immigrant with both parents foreign-born
Language	ENGLISH PROFICIENT	DV: child speaks only English or speaks English very well or well
Family Variables (for school enrollment only)	HOUSEHOLD INCOME	Annual household income received in 1989 in case of Census, and in 1995 in case of CPS.
	NUMBER OF SIBLINGS 0	DV: number of siblings is 0
	NUMBER OF SIBLINGS 1	DV: number of siblings is 1
	NUMBER OF SIBLINGS 2	DV: number of siblings is 2
	NUMBER OF SIBLINGS 3	DV: number of siblings is 3
	NUMBER OF SIBLINGS 4+	DV: number of siblings is equal to or greater than 4

TABLE A-1 (continued) DEFINITION OF VARIABLES		
Variables	**Code**	**Description**
	MOTHER'S EDUCATION	Highest level of education attained by mother (years)
	FATHER'S EDUCATION	Highest level of education attained by father (years)
	MOTHER WORKS FULL TIME	DV: mother works more than 35 hours per week
	MOTHER WORKS PART TIME	DV: mother works less than 35 hours per week

DV designates a dichotomous variable equal to unity for the designated characteristic, otherwise it is zero.

Note to Table A-1

*Country of origin Variables: SOUEURO (Southern Europe) includes Albania, Italy, Malta, Monaco, Portugal, Madeira Island, Spain, Vatican City, Yugoslavia.

EACEURO (East and Central Europe) includes Austria, Belgium, Czechoslovakia, Denmark, Germany (East and West), Berlin (East and West), Liechtenstein, Luxembourg, Netherlands, Switzerland, Hungary, Poland, Romania, USSR, Baltic States, Estonia, Latvia, Lithuania.

NOWEURO (North and West Europe) includes Faroe Islands, Jan Mayen, Finland, Iceland, Norway, Sweden, Svalbard, Lapland, Andorra, France, Guernsey, Jersey, Azores Islands, Madeira Islands.

STHASIA (South Asia) includes Afghanistan, Bangladesh, Bhutan, Burma, India, Pakistan, Sri Lanka, Nepal.

EASTASIA (East Asia) includes Japan, Korea, Macau, Mongolia, Taiwan.

OTHASIA (Primarily South-east Asia) includes Brunei, Cambodia, Hong Kong, Indonesia, Laos, Malaysia, Singapore, Thailand, Indochina.

MIDEAST (Middle-East) includes Bahrain, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Quatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen, Mesopotamia, Palestine, Persian Gulf States, West Bank.

ENGSPPOB (English-speaking countries) includes United Kingdom, England, Ireland, Scotland, Wales, Canada, Australia, New Zealand; English-speaking parts of Caribbean islands (Bahamas, British Virgin Islands, Jamaica, and British West Indies).

REMAIN includes all other countries and areas not included in the other country categories. Primarily islands in Oceania and foreign country of birth not reported.

Other country codes are self-explanatory.

TABLE A-2

MARGINAL EFFECTS OF POOLED SAMPLE OF FIRST-GENERATION, SECOND-GENERATION, AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990 [(a)]

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	**(1)**	**(2)**
Male	0.001	0.001
Age3	-0.235	-0.236
Age5	0.301	0.301
Black	0.069	0.070
Hispanic	0.001	0.003
South	0.006	0.005
Rural	-0.083	-0.082
English Proficiency	-0.058	-0.060
Mother's Education	0.019	0.019
Father's Education	0.011	0.011
Mother works full-time	0.014	0.014
Mother works part-time	0.061	0.061
1 Sibling	0.467	0.018
2 Sibling	0.011	0.011
3 Sibling	-0.021	-0.022
4+ Sibling	-0.031	-0.032
Household Income	2.12e-06	2.11e-06
First-Generation	0.096	n.e.
Second-Generation	0.038	0.038
Age-at-Immigration 2+	-0.062	-0.053

TABLE A-2 (continued)

MARGINAL EFFECTS OF POOLED SAMPLE OF FIRST-GENERATION, SECOND-GENERATION, AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)[a]
BIRTHPLACE		
English speaking countries	n.e.	0.191
Africa	n.e.	0.035
Mexico	n.e.	0.084
Cuba	n.e.	0.425
S. & C. America	n.e.	0.063
Caribbean	n.e.	-0.125
Southern Europe	n.e.	0.138
E. & C. Europe	n.e.	-0.023
N. & W. Europe	n.e.	0.425
Philippines	n.e.	0.058
China	n.e.	0.241
Vietnam	n.e.	0.175
East Asia	n.e.	0.102
South Asia	n.e.	0.021
Middle East	n.e.	-0.057
Other Asia	n.e.	0.178
Remainder Countries	n.e.	0.218
Pseudo R^2	0.174	0.174
Sample size	80,714	80,714

Note: Variables are as defined in Table A-1.
n.e. = Variable not entered.
[a] benchmark group is all 3 to 5 year age-group native percentage children

Source: Table 3

TABLE A-3

MARGINAL EFFECTS OF FIRST-GENERATION CHILDREN, UNITED STATES, 1990 [a]

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
Male	0.023	0.020
Age3	-0.238	-0.254
Age5	0.341	0.345
Black	-0.006	0.010
Hispanic	-0.064	0.022
South	0.037	0.019
Rural	0.003	-0.001
English Proficiency	0.027	0.026
Mother's Education	0.010	0.010
Father's Education	0.009	0.009
Mother works full-time	0.011	0.009
Mother works part-time	0.081	0.071
1 Sibling	0.107	0.122
2 Sibling	0.036	0.040
3 Sibling	0.035	0.058
4+ Siblings	0.133	0.166
Household Income	1.74e-06	1.40e-06
Age-at-immigration 2+	-0.064	-0.068
BIRTHPLACE		
Africa	n.e.	-0.116
Mexico	n.e.	-0.223

TABLE A-3

MARGINAL EFFECTS OF FIRST-GENERATION CHILDREN, UNITED STATES, 1990 [(a)]

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	(1)	(2)
Cuba	n.e.	0.303
S. & C. America	n.e.	-0.156
Caribbean	n.e.	-0.271
Southern Europe	n.e.	-0.088
E. & C. Europe	n.e.	-0.191
N. & W. Europe	n.e.	0.294
Philippines	n.e.	0.141
China	n.e.	0.072
Vietnam	n.e.	-0.121
East Asia	n.e.	-0.052
South Asia	n.e.	-0.168
Middle East	n.e.	-0.231
Other Asia	n.e.	-0.124
Remainder Countries	n.e.	-0.036
Pseudo R^2	0.182	0.200
Sample size	1,556	1,556

Note: Variables are as defined in Table A-1.
n.e. = Variable not entered.
[a] benchmark group is all 3 to 5 year age-group native-parentage children.

Source: Table 5

TABLE A-4

MARGINAL EFFECTS OF SECOND-GENERATION AND NATIVE-PARENTAGE CHILDREN, UNITED STATES, 1990

DEPENDENT VARIABLE: SCHOOL ENROLLMENT

AGE-GROUP 3 TO 5 YEARS

Variable	Second-Generation	Native-Parentage	All Native-Born
Male	0.002	-0.001	0.001
Age3	-0.253	-0.234	-0.236
Age5	0.333	0.299	0.301
Black	0.078	0.076	0.071
Hispanic	-0.043	-0.005	0.003
South	0.035	0.002	0.006
Rural	-0.059	-0.079	-0.082
English Proficiency	-0.010	-0.054	-0.068
Mother's Education	0.011	0.024	0.020
Father's Education	0.004	0.015	0.012
Mother works full-time	0.006	0.015	0.013
Mother works part-time	0.046	0.060	0.061
1 Sibling	0.022	0.013	0.016
2 Sibling	0.045	0.004	0.010
3 Sibling	0.007	-0.030	-0.023
4+ Siblings	0.013	-0.059	-0.041
Household Income	1.98e-06	2.03e-06	2.10e-06
Mother foreign-born	n.e.	n.e.	0.020
Father foreign-born	n.e.	n.e.	0.030
Both parents foreign-born	n.e.	n.e.	0.051
Pseudo R^2	0.197	0.173	0.174
Sample size	9,392	69,766	79,158

Note: Variables are as defined in Table A-1.
n.e. = Variable not entered.

Source: Table 7